

Teaching Unit: **1. Geometry**

Essential Understandings

- Different geometric shapes have different properties: different numbers of sides, different angle measurement.
- Angles have specific properties to help identify them from each other.
- There are specific terms/math vocab that name unique shapes: equilateral, scalene, isosceles, etc.
- Mental images of common angles help us estimate when problem-solving.

Teaching Unit: **Algebra**

Essential Understandings

- Relationships can be expressed using numbers, variables, and operations.
- Symbols such as numbers and variables can be manipulated using different processes and operations to represent real-life quantities and their relationships.
- Equations are dynamic tools for problem solving and communicating and expressing ideas and concepts.
- Functions are used to represent the relationship between unknown quantities.
- Patterns that relate to linear functions arise when there is a constant rate of change.
- Functions and patterns of change can be represented by using tables, graphs, words, and symbolic expressions (equations).
- Equations can be solved by balancing the equation using inverse operations (whatever you do to one side, you do to the other).

Sub Topic: **Exploratory**

Knowledge and Skills

- Create figures from ropes and identify what they were/knew.
- Use mirrors to recognize that some shapes will go together to complete a 360° circle. (Whether they will or not is due to the angle measure being put into the mirror.)
- Make a reasonable estimate of an angles size when shown a physical shape containing angles.

Sub Topic:

Knowledge and Skills

- Identify patterns in daily life, classroom studies, numerical sequences, and figure patterns.
- Express patterns as a rule to determine an unknown.
- Understand equal to mean both sides of the number model have an equivalent value.
- Use and interpret $>$, $<$, $+$, $-$, \times , \div , $=$, \neq .
- Express generalizations using numbers and variables (Ex: $6 + n$)
- Interpret formulas (Ex: $A = l \times w$)
- Use variables to write algebraic expressions for different situations.
- Assign variables and translate problems into algebraic sentences.
- Solve equations using guess and check.
- Understand and be able to use models (balance scale) for solving equations.
- Work backwards to identify missing numbers (inverse operations).

Teaching Unit: ***Fractions, Decimals, Percents***

Essential Understandings

- Rational numbers can be represented in multiple ways.
- Fractions, Decimals, and Percents can be represent the same amount differently.
- The relationships and rules that govern whole numbers, govern all rational numbers.
- Fractions, Decimals, and Percents can be modeled, compared, and ordered.
- Ratios use division to represent relationships between two quantities.
- Number sense means understanding the relationship between numbers.
- In certain situations an estimate is as useful as an exact answer.

Sub Topic:

Knowledge and Skills

- Understand odd and even.
 - Identify prime and composite.
 - Compare quantities as more, less, or equal.
 - Use divisibility rules for numbers 2-10.
 - Apply factors and multiples.
 - Decompose numbers into their prime factorization. (Factor trees, product of prime numbers).
 - Write fraction and decimal phrases into number form.
 - Understand fractions as division of whole numbers.
 - Understand fractions as part of a set, part of an area, and locations on the number line.
 - Read and write fractions and mixed numbers.
 - Recognize and name equivalent fractions.
 - Determine the greatest common factor (GCF) and the least common multiple(LCM) for a set of numbers.
 - Identify rational numbers.
 - Use the concept of ratio to represent quantitative relationships.
 - Order fractions, including improper fractions and mixed numbers.
 - Compare fractions, decimals and percents using pictures, objects and numbers.
 - Identify and describe relationships between fractions, decimals and percents.
 - Order fractions, decimals, and percents.
 - Use ratios to compare quantities and solve problems.
 - Use estimating (greater than or less than a $\frac{1}{2}$), cross multiplication, least common denominator (LCD), and writing fractions as decimals to compare fractions.
-

Teaching Unit: **3.Geometry**

Essential Understandings

Two-dimensional polygons have distinct characteristics and qualities that are measurable.

1. Intersecting lines can form angles with certain relationships-(vertical angles, perpendicular angles, adjacent angles).
2. There are specific relationships existing between angles based on their measures-complementary & supplementary angles.
3. Triangles can be classified or constructed based on their sides and/or angles-(right, obtuse, acute, equiangular, equilateral, isosceles, scalene, triangle inequality theorem).
 - The longest side of a triangle is opposite the largest angle of the triangle.
 - The Pythagorean Theorem is essential for solving problems involving right triangles.
4. Quadrilaterals can be classified based on their sides and/or angles (parallelogram, trapezoid, rhombus, square, rectangle).
 - Quadrilaterals have a hierarchical nature.
5. Construction techniques for geometric figures may include: compass, straightedge, paper folding, tracing of geometric shapes, protractor, or computer software.
6. Similar figures have the same shape but may have different sizes.
7. Congruent figures are also similar, but similar figures are not necessarily congruent.
8. Ratios and proportions can be used to figure out the length of the sides of a figure.
9. A constant ratio exists between corresponding lengths of sides of similar figures.
10. A specific scale factor is used to enlarge or reduce a figure.
11. Polygons are classified by the number of sides it contains- (pentagon, hexagon, heptagon, octagon, nonagon, decagon, 11-gon).
12. A regular polygon will tessellate the plane if the measure of an interior angle is a factor of 360.
13. Coordinates of a point define its location in a coordinate plane.
14. The size or shape of a figure does not change by a transformation, such as a translation, reflection, or rotation, but it will change the position of the figure.

Sub Topic: ***Lines & Angles***

Knowledge and Skills

Use supplementary & complementary angles.

1. Identify, measure, classify, and name angles. Use these measures to find the measures of unknown angles.
 2. Recognize that vertical angles are equal.
 3. Identify polygons by their angles and sides.
 4. Construct geometric figures, including angles, and triangles, using specific tools. Estimate before drawing using knowledge of angles.
 5. Decide whether a triangle can be formed based on its side length or angle measures.
 6. Find the angle measure of a missing measure in a triangle and quadrilateral
 7. Classify angles and polygons, and give values of a figure based on its classification.
 8. Construct and interpret circle graphs.
 9. Identify corresponding sides and angles of similar figures.
 10. Write proportions to show the relationship of the corresponding sides of similar figures.
 11. Use cross multiplication or proportionality to determine if figures are similar.
 12. Understand that enlarging or reducing by a scale factor leaves the angles measures unchanged.
 13. Solve problems involving the measure of interior angles of polygons.
 14. Design and identify tessellations in art, construction, and nature.
 15. Identify and label the axes and quadrants of a coordinate plane.
 16. Graph and identify ordered pairs on a coordinate plane.
 17. Translate and reflect polygons on a coordinate plane using knowledge of line symmetry and the X axis and Y axis.
-

Teaching Unit: ***Geometric Measurement***

Essential Understandings

Two-dimensional figures have special characteristics that help people with designing and constructing.

Understand how the terms: square, square root, base, height, length, width, area, perimeter, and the concept of Pi, help in applying some formulas for finding area.

Sub Topic: ***Two-Dimensional Figures***

Knowledge and Skills

Identify and draw 2-dimensional figures.

Find the perimeter of 2-dimensional figures.

Find squares of numbers.

Find exact square roots of numbers up to 400.

Estimate square roots of numbers that are not perfect squares.

Figure out how to find the area of a parallelogram, triangle, trapezoid, and circle using known facts about finding the area of a square and rectangle.

Use formulas to find the area of a 2-dimensional figures.

Use appropriate units of measure when finding area.

Subdivide a polygon to find the area of a complex figure.

Apply area of perimeter formulas to solve real-life situations (constructing a floor plan).

Teaching Unit: ***Fractions***

Essential Understandings

- Computing with fractions can be related to many aspects of daily life and jobs (food, carpentry, cooking, sewing)
 - The relationships and rules that govern whole numbers, govern all rational numbers.
 - Using models helps with visualizing the sizes of fractions.
 - Estimation helps determine the reasonableness of an answer.
 - An increase or a decrease of the original value can be predicted when computing with fractions.
 - When fractions, improper fractions or mixed number are added or subtracted the same rules of computation apply as for whole numbers.
 - When we multiply or divide a fraction we may get a product or quotient that is bigger than the original number, smaller than the original number, or equal to the original number.
 - When multiplying fractions it helps to remember that multiplying also means “of”, so $\frac{1}{2}$ of $\frac{1}{4} = \frac{1}{8}$.
 - When multiplying two proper fractions, the product is always a smaller fraction.
 - When dividing two proper fractions, the quotient is always a larger fraction
-

Sub Topic: ***Operations***

Knowledge and Skills

- Estimate the sum, difference, product, and quotient of fractions and mixed number.
- Demonstrate an understanding of the operations with fractions and mixed numbers using models.
- Add, Subtract, multiply, and divide numbers with like and unlike denominators.
- Solve problems that involve computing with fractions.

Teaching Unit: *Data Analysis & Probability*

Essential Understandings

- Appropriate statistical methods are necessary to become intelligent consumers.
- The collection, organization, and display of data are used to answer questions.
- The choice of data display can affect the visual message communicated.
- Inferences and predictions from data are used to make critical and informed decisions.
- Probability can be used to make decisions, predictions, or choices.

Sub Topic:

Knowledge and Skills

- Be able to design a way to investigate a question or problem.
 - Determine wording to generate fair unbiased information.
 - Collect data via observations, surveys, samplings, experiments.
 - Understand the purpose of different graphs.
 - Create charts/frequency tables, bar graphs, circle graphs, line graphs, line plot, box-and whisker plot, histogram.
 - Read and write parts of a graph: title, labels on x-axis and y-axis.
 - Understand types of scales.
 - Create and interpret keys/legends.
 - Understand data information: minimum & maximum value, range.
 - Find measures of center: mean, median, mode.
 - Interpret relationships in the data set- cluster, outliers, gaps, range, etc
 - Experience activities with random generators (dice, spinners).
 - Test predictions.
 - Develop vocabulary to express probable outcomes (experimental and theoretical probability).
-

Teaching Unit: ***2.Problem Solving***

Essential Understandings

- Problem solving promotes mathematical learning.
- Problem solving is knowing what to do when confronted with unfamiliar problems.
- Problem solving is making and examining conjectures and posing follow up questions.
- Solving problems may require multiple steps. An organized approach will help break the problem down.

Sub Topic:

Knowledge and Skills

- Recognize real life problems – and what it might require to solve them.
 - Use the four steps of 1. Explore, 2. Plan, 3. Solve, and 4. Examine to work through a variety of real-life problems.
 - Know what each of the 4 steps mean and be able to show how they can be applied to any particular problem.
 - Develop a variety of strategies to solve a problem.
 - Evaluate the effectiveness of a chosen strategy.
 - Predict a solution to a problem.
 - Determine if the solution is reasonable by comparing it to the prediction.
 - Explain thinking and reasoning for a variety of problems.
-

Teaching Unit: **4. Number & Number Sense**

Essential Understandings

- There are many ways to represent a number.
 - The position of a digit in a number affects its value.
 - Number sense develops through experience.
 - The relationship among the operations and their properties promote computational fluency.
 - Rounding and Estimating help check to see if actual answers make sense.
 - There are efficient methods for finding sums, differences, products, and quotients. Knowing something about factors, divisors, the divisibility rules, multiples, and properties can aid the efficiency.
 - The order you perform operations affects the outcome.
 - Patterns of 10's are a structure of the metric system.
 - Exponents are a way to represent repeated multiplication.
 - Powers of 10 can be written in exponential form.
 - Knowing about exponents and scientific notation can help with converting units of measure in the metric system.
 - Numbers can be converted between standard form and scientific notation using decimals and exponents.
 - Integers are useful for noting relative changes or values.
 - Every numerical operation has an inverse.
 - Absolute value is useful in ordering and graphing positive and negative numbers.
 - Computation with positive and negative numbers is often necessary to determine relationships between quantities.
 - Models, diagrams, manipulatives, and patterns are useful in developing and remembering algorithms for computing with positive and negative numbers.
-

Sub Topic: **Whole Numbers, decimals, order of**

Knowledge and Skills

- Identify place value positions.
- Read and write numbers to 10 million in numerals and words.
- Round numbers to the place value appropriate to a given context.
- Compare and order numbers up to 10 million.
- Estimate the sum, difference, product, and quotient of whole numbers and decimals.
- Select and use appropriate estimation techniques to check to see if an answer makes sense.
- When estimating products and quotients, use numbers that can be computed mentally with ease.
- Use efficient methods for finding sums, differences, products, and quotients with whole numbers, decimals, and integers.'
- Use properties (Commutative, Associative, Distributive, Identity, Zero) to help with computation efficiency.
- Demonstrate fluency with multiplication facts (0-12).
- Use remainders in fractional and/or decimal form.
- Write powers of 10 in exponential form.
- Convert numbers between standard form and scientific notation.
- Understand and write repeated multiplication in exponential form.
- Solve problems using the order of operations.
- Recognize relationships within the metric system (such as milli, centi, & kilo) using the basic units of meter, liter, and gram.
- Carry out conversions within the metric system.